



SUSTAINABLE FORESTRY PRACTICES

Guidelines for the Northern Territory

Field guide

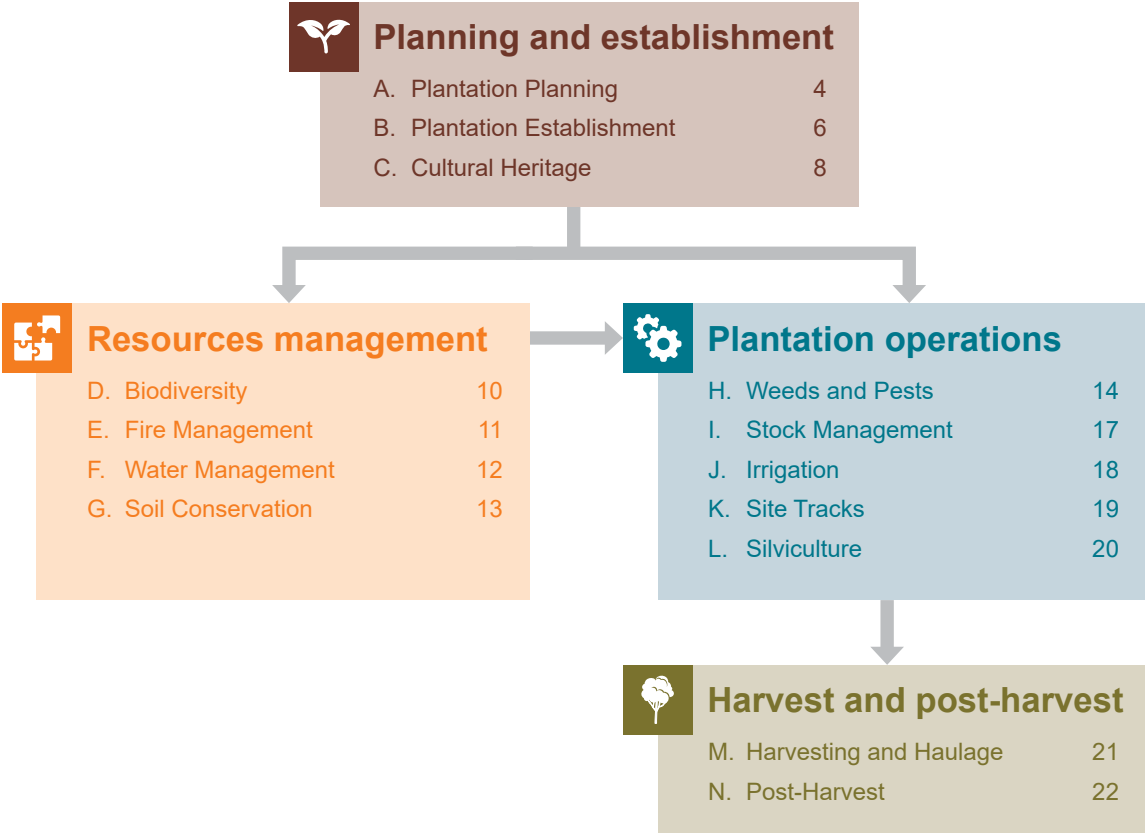


This field guide provides a summary listing of the practices outlined in the Sustainable Forestry Guidelines for the Northern Territory. It has been designed for use by plantation forestry practitioners on site and is specific to Northern Territory conditions, in particular the Top End region.

The aim of the guidelines is to promote sustainable forestry practices and allow land managers to assess where they currently stand in regard to their management methods. However, there are a variety of forestry operations and individual plantation characteristics that will influence management approaches.

The sections have been categorised as most applicable to planning and establishment, plantation operations, resources management, or harvest and post-harvest (refer to diagram). The sections can be addressed sequentially or by category, and within each section, the practices can be worked through item by item.

The full version of the guidelines provides additional background information and guidance.



A. Plantation Planning



- ▶ Where possible, plantations established on already cleared land. Community consultation carried out before any land clearing etc. takes place.
- ▶ Site suitability addressed including aspects such as topography, drainage, water retaining capacity of soil, soil fertility, pH and other physico-chemical properties of soils.
- ▶ Soil types and depth, landforms and watercourses mapped and site capability assessed. Area mapped using Geographic Information System (GIS).
- ▶ Species selected that are suited to the climatic conditions of monsoonal northern Australia, and that have been shown to grow successfully in the Top End. Species selected that can be contained to plantation area.
- ▶ Species selected that can withstand high winds, and ideally plantations situated away from the coast (where destructive winds from tropical cyclones are most intense).
- ▶ Depending on land tenure and zoning, non-pastoral use guidelines addressed or appropriate application lodged. In the case of Aboriginal land, the relevant land council contacted and a section 19 Land Use Agreement expression of interest submitted.
- ▶ Plantation Operation Plan for at least one full crop cycle developed prior to initiation of plantation establishment process.
- ▶ Location of nursery, availability of seedlings and operations facilities considered in plantation planning, including access to a main road and source/s of water.
- ▶ Track drainage and watercourse crossings considered in placement of roads and tracks. Soil disturbance and cut and fill minimised.



- ▶ Access track layout pre-planned prior to forest establishment works. Layout takes into account location of roading materials and access for harvest.
- ▶ Watercourses and buffer widths identified on plan and marked in the field.
- ▶ Fire protection planning undertaken in coordination with relevant agencies and local bush fires groups.
- ▶ As a minimum, allowance made for firebreaks of 4 m width along (or as close as practicable to) all property boundaries as designated in the Northern Territory (NT) Land Clearing Guidelines.
- ▶ Where possible, roads and firebreaks combined.
- ▶ Where possible, Indigenous communities involved.
- ▶ Cultural heritage in the proposed plantation area protected.
- ▶ Biodiversity (flora and fauna) values, particularly sensitive vegetation types and threatened flora and fauna, assessed in the proposed plantation area.
- ▶ Where irrigation is planned, applications submitted for water allocations and licences.
- ▶ Consideration given to obtaining industry certification for the plantation, as required by certain markets.
- ▶ Costed plan developed for establishment and maintenance of plantation.
- ▶ Forestry Industry Association Northern Territory (FIANT) contacted for advice.

B. Plantation Establishment

- ▶ Seed or plant sourcing considered early to allow for significant lead times.
- ▶ Nursery hygiene adequate to ensure healthy stock.
- ▶ Site preparation takes site attributes into consideration.
- ▶ Soil cultivated to fracture profile and encourage rapid early root growth and tree establishment while minimising bare soil exposure.
- ▶ Planting timed taking into account seasonal aspects of a tropical wet/dry climate.
- ▶ Seedlings planted when soil moisture is at field capacity (the window for planting in the Top End is limited).
- ▶ Plantations designed to constrain or prevent the spread of wildlings into surrounding areas.
- ▶ Plantation specific initial spacing determined to ensure ultimate stand density allows for efficient plantation growth, management and harvest.
- ▶ Record keeping system established for planting date, rainfall records, chemical use, pests and diseases and other relevant information.
- ▶ Requirement for fertiliser application at planting considered.
- ▶ Area of grass control around planted seedlings minimised (taking into consideration fire risk).



- ▶ Weeds controlled regularly in the first few years to facilitate tree vigour and plantation establishment.
- ▶ Application of herbicides appropriately targeted to weed species being controlled.
- ▶ Roads and tracks constructed in the dry season to avoid excessive erosion and delays due to inundation and boggy conditions.
- ▶ Fire protection burns carried out annually (or as required) in early dry season.
- ▶ Firebreaks established in compliance with the Land Clearing Guidelines. Firebreaks regularly maintained.
- ▶ Processes and procedures in Plantation Operation Plan adopted.
- ▶ Plantation establishment works conducted in a manner that does not compromise the safety of workers.
- ▶ Sites with significant cultural heritage values avoided.
- ▶ Areas that support significant biodiversity values retained.
- ▶ Water allocations and licences obtained.

C. Cultural Heritage

- ▶ Request lodged for information from Aboriginal Areas Protection Authority (AAPA) concerning any known sacred site records that may exist over an area of interest.
- ▶ Authority Certificate from AAPA obtained where required.
- ▶ Traditional owners consulted where necessary. The Northern Land Council (NLC) or Tiwi Land Council contacted to determine the traditional owners with connection to the land under consideration.
- ▶ Conference with custodians of the relevant sacred sites requested where necessary to discuss the terms and conditions of an Authority Certificate.
- ▶ Any sites on the NT Heritage Register identified.



D. Biodiversity

- ▶ Presence of significant biodiversity values assessed for the property.
- ▶ Significant environmental values protected, including local populations of threatened plants, sensitive or significant native vegetation and breeding habitat of threatened animals.
- ▶ Native old growth trees (>40 cm DBH) protected and tree hollows retained.
- ▶ Impacts on environmental values of conservation areas or other important biodiversity areas adjacent to the property or plantation minimised.
- ▶ Riparian vegetation retained. Buffers between riparian areas and plantations preserved.
- ▶ Disturbance to waterways and wetlands, including flow regimes, minimised.
- ▶ Where possible, native habitats retained. Habitat degradation as a result of changed hydrology, fire regimes or spread of invasive (weed) species avoided.
- ▶ Habitat trees and biodiversity corridors retained.
- ▶ Plantation tree species confined to plantation area. Spread into surrounding habitats and native vegetation communities avoided.

E. Fire Management

- ▶ Fire management compliant with local/shire and Territory regulations including development of a Fire Management Plan.
- ▶ Fire protection planning conducted in coordination with relevant land management agencies, Bushfires NT, and local bush fires groups.
- ▶ Planted forest areas partitioned by access tracks which act as firebreaks.
- ▶ Firebreaks constructed and regularly maintained, including slashing where necessary to remove ground layer fuels.
- ▶ Firebreaks maintained in early dry season once conditions ensure minimal ground disturbance and wet season growth can be cleared away to create mineral earth break.
- ▶ Spraying of firebreaks during the wet season considered (as it can reduce the need to remove large amounts of growth in the dry season).
- ▶ Fire Management Plan developed that considers site factors, species and seasonal conditions.
- ▶ Controlled burning takes into consideration fuel loads, fire severity index, prevailing wind direction and predicted fire behaviour.
- ▶ Controlled burns conducted in early dry season or during dry spells in the wet season. Burns undertaken only in suitable weather conditions; burns postponed on windy, low humidity days.
- ▶ Expert advice incorporated in Fire Management Plan.
- ▶ Firebreaks of minimum 4 m width installed along (or as close as practicable to) all property boundaries, in accordance with the *NT Bushfires Management Act*. Larger breaks installed where invasive grasses (e.g. Gamba Grass) or native grasses create high fuel loads.



F. Water Management

- ▶ Drainage areas, wetlands and waterways protected.
- ▶ Disturbance to waterways minimised.
- ▶ Site characterised to understand soil chemical impacts from drainage, mounding and other soil disturbance activities.
- ▶ Hydrological impacts of drainage, mounding and other soil disturbance activities investigated. Appropriate management actions undertaken to minimise disruption to water flows and sediment movement.
- ▶ Mounding designed to improve drainage and minimise disruption to overland flow paths.
- ▶ Sites selected and managed to avoid exposure to seasonal waterlogging, loss of production and excessive wind-throw.
- ▶ Variation in soil type, soil nutrient fertility and organic matter characterised through soil sampling and mapping.
- ▶ Standardised fertiliser application at planting considered. Supplementary fertiliser provided as necessary over the growth cycle based on visual characteristics and soil and/or foliar analysis.
- ▶ Type and amount of fertiliser matched to site attributes, species requirements and seasonal conditions. Soil testing considered prior to fertilising.
- ▶ Records retained of location, date, type, quantity and method of fertiliser application.
- ▶ Runoff water quality monitored and records maintained.

G. Soil Conservation

- ▶ Erodibility of soil surface considered when planning plantation infrastructure, layout and machine operations.
- ▶ Erosion and Sediment Control Plan (ESCP) developed for each site/ plantation.
- ▶ Disturbance minimised by retaining as much of the existing vegetation as possible, especially adjacent to drainage lines.
- ▶ Erosion potential minimised by avoiding timber production on steep slopes, and retaining native vegetation or establishing environmental plantings on slopes.
- ▶ Erosion and sediment control works planned to control the potential build-up of volume and velocity of surface water flows, and to limit the formation of concentrated flows.
- ▶ Erosion and sediment control measures (e.g. regrassing, mulching, gravel or rock lining, etc.) installed to protect soil surfaces to prevent or reduce erosion caused by raindrop impact and storm water flows.
- ▶ Erosion and sediment control works planned to intercept runoff and retain sediment.
- ▶ Roads located and designed to minimise run-off.
- ▶ Off-track driving avoided to reduce incidence of soil compaction.
- ▶ Fertiliser application managed to minimise off-target nutrient movement.



H. Weeds and Pests

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- ▶ Weed, pest and disease impacts monitored regularly.
 - ▶ Weed infestations, particularly of declared weeds, eradicated or controlled.
 - ▶ Regional weed priorities recognised, as detailed in regional weed management plans.
 - ▶ An integrated weed control approach adopted, using a variety of techniques including physical, chemical and biological control.
 - ▶ Integrated weed and pest management plan developed. Weed occurrences surveyed and mapped to enable targeted control and follow-up.
 - ▶ Use of chemicals to control pests and diseases minimised.
 - ▶ Where possible, herbicide use restricted to close proximity to plantation trees.
 - ▶ In some instances weeds between tree rows controlled by slashing or shrouded sprays of broad-spectrum herbicides.
 - ▶ Herbicide use restricted to plantation areas using application methods that minimise off-target spray.
 - ▶ Roadsides etc. treated with herbicides to prevent spread of weeds by haulage and other traffic.
 - ▶ Registered herbicides applied according to label specifications or off-label permitted use.



- ▶ Adverse effects on the environment minimised by appropriate selection of chemicals, application rates and methods.
- ▶ Handling, use and application of chemicals conducted by suitably trained and licenced personnel.
- ▶ Records of herbicide and pesticide use (date, rate, location, weed species, application method, weather, etc.) maintained.
- ▶ Chemical handling and storage conducted to minimise risks to human health, site contamination and off-site pollution.
- ▶ Empty chemical containers, unused chemicals and other plantation and machinery waste handled in accordance with legal requirements.
- ▶ Weed control undertaken as required.
- ▶ Introduction and spread of new weeds prevented.
- ▶ Weeds, pests and diseases prevented from spreading into adjacent lands and vegetation communities.
- ▶ Vehicles and machinery washed down in a designated area. Washdown area maintained weed free.
- ▶ Management prioritised along pathways for weed spread, such as road and track networks, areas of ground disturbance and river corridors.

- ▶ Weed management undertaken in cooperation with adjacent landholders, other land users, and NT Government Weed Management Branch.
- ▶ Control of wild dogs compliant with regional wild dog management. Where 1080 baits are to be used, application completed for a 1080 Pest Animal Management Authorisation (PAMA) and baiting done under a Permit to Take Protected Wildlife (1080 PAMA and Permit).
- ▶ Where present, feral pigs controlled on-ground and by exclusion fencing of sensitive areas.
- ▶ Potential insect and disease problems managed proactively by undertaking regular plant health surveillance and monitoring.
- ▶ Termite traps and spraying used to control termite infestations.
- ▶ Hygiene thinning or clearing considered to contain pest and disease outbreaks.
- ▶ Where weeds, pests or diseases cause significant damage, decline, or deaths of trees, prompt specialist advice sought to address the problem.

I. Stock Management

- ▶ Stock excluded until trees are large enough to withstand grazing activity.
- ▶ Grazing managed to avoid selective browsing, minimise damage to trees and optimise tree growth.
- ▶ Stock excluded from riparian creek lines and steep slopes through fencing.
- ▶ Watering points provided away from creeks and steep slopes.



J. Irrigation

- ▶ Irrigated forest established on deep soils (>2m) with moderate permeability and medium to high water holding capacity.
- ▶ Water extraction licence obtained.
- ▶ Irrigation rate matched to the limiting consideration of tree water use.
- ▶ Water application rate calculated and employed that does not exceed soil permeability infiltration rate.
- ▶ Soil profile characterised and soil types mapped to match site capability with water chemistry, forestry type and irrigation practice.
- ▶ Irrigation water tested and monitored to match water chemistry with soil type, forestry type and irrigation practice.
- ▶ Irrigation scheduled based on estimated soil moisture content, taking into account seasonal rainfall, evaporation and local weather conditions.
- ▶ Irrigation reduced or stopped where wet season conditions supply adequate soil moisture.
- ▶ All irrigation records maintained.
- ▶ Water usage compliant with allocation and reported each month.
- ▶ Groundwater monitored for depth and quality.

K. Site Tracks

- ▶ Access track layout planned prior to plantation establishment works. Roads located and designed to minimise disturbance and run-off.
- ▶ Whoa boys, turn-outs, filter strips, buffer zones, and sediment detention basins used to divert runoff and reduce loss of topsoil.
- ▶ Tracks regularly maintained and managed to minimise deterioration due to erosion by heavy wet season rainfall events.
- ▶ Tracks constructed and maintained when soil moisture is optimal to avoid excessive disturbance and minimise cost of watering.
- ▶ Site tracks considered as part of the Erosion and Sediment Control Plan (ESCP) for the site.
- ▶ Tracks designed to minimise cut and fill, avoid steep gradients, and prevent disturbance to the environment, particularly watercourses.
- ▶ Tracks designed with appropriate drainage structures. Culverts and crossings installed on watercourses to minimise disturbance and ensure maintenance of seasonal flows.
- ▶ Tracks decommissioned and rehabilitated when not required.
- ▶ Weed-free road base materials used.
- ▶ Weeds along access tracks controlled or eradicated.
- ▶ Roads/tracks closed during wet conditions when unacceptable damage would occur or when other conditions warrant closure.
- ▶ Access during the wet season restricted to designated areas where tracks are suitably constructed.



L. Silviculture

- ▶ Control of competition from grasses and weeds maintained until saplings capture control of site.
- ▶ Stand progressively thinned where necessary to maximise stem volume growth, maintain optimal stocking and canopy cover, and maximise vigour.
- ▶ Thinning undertaken either manually or mechanically.
- ▶ Where required, stand progressively pruned to minimise knotty core, remove ladder fuels, and improve timber quality.
- ▶ Pruning, if required, carried out during the dry season in periods of low sap flow and prior to onset of active growth.
- ▶ Type and amount of fertiliser matched to site attributes, species requirements, seasonal conditions and projected economic returns.
- ▶ Integrated weed and pest management principles applied. Pesticide and herbicide use planned to minimise adverse effects on the environment.
- ▶ Silvicultural activities conducted in a manner that does not compromise the safety of workers.
- ▶ Rotation length commensurate with forest product being grown.

M. Harvesting and Haulage

- ▶ Harvest protocol developed prior to commencement of harvest.
- ▶ Harvest Plan prepared and timber harvest carried out according to the Plan.
- ▶ Harvest Plan includes timing, method, area selection, access tracks, extraction routes, log or chipper landings, internal and external haulage routes, equipment, products, soil types, environmental hazards and values, and cultural values.
- ▶ Soil, water and biodiversity values considered in Harvest Plan.
- ▶ Safety management included in Harvest Plan.
- ▶ Harvest boundaries clearly demarcated in the field.
- ▶ Soil disturbance for harvest access infrastructure minimised and appropriately drained onto undisturbed areas.
- ▶ Harvesting avoided on wet ground and during prolonged heavy rainfall.
- ▶ Harvesting operations conducted in a manner that does not compromise the safety of workers.
- ▶ Vehicle and machinery wash-down area established to prevent spread of weeds and pathogens. Haulage hygiene maintained so that weed seeds or material containing weeds is not spread off-site.
- ▶ Landings located on well-drained areas as far as practicable from watercourses.
- ▶ Haulage tracks planned to optimise extraction routes.
- ▶ Post-harvest management plan developed for rehabilitation or replanting or coppicing, and monitoring.

N. Post-Harvest

- ▶ Post-harvest management plan developed; either rehabilitation, other land use or subsequent rotation.
- ▶ Adaptive management applied to establish best practice based on experience gained during first rotation.
- ▶ Soil and water values protected.
- ▶ Declared weeds controlled or eradicated.
- ▶ Spread of exotic plantation species controlled.
- ▶ Post-harvest objectives and end use defined on the basis of proposed future land use.
- ▶ Site factors considered including topography, watercourses, soil types, erodibility and preservation of natural values.
- ▶ Harvest residues managed and utilised.
- ▶ Fire management regime maintained.
- ▶ If area to be rehabilitated, land revegetated with native plant species sourced locally.



The *Sustainable Forestry Practices: Guidelines for the Northern Territory* have been developed by TNRM and the working group to provide a set of practical guidelines that are relevant to the environment and conditions in the Northern Territory. The working group members were Frank Miller (African Mahogany Australia), Hanna Lillicrap (Plantation Management Partners), Steve Hindley (Quintis), Quinten Pope (Plantation Management Partners), Mark Ashley (Tiwi Plantations Corporation) and Mark Annandale (LANDROC/Gumatj).



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